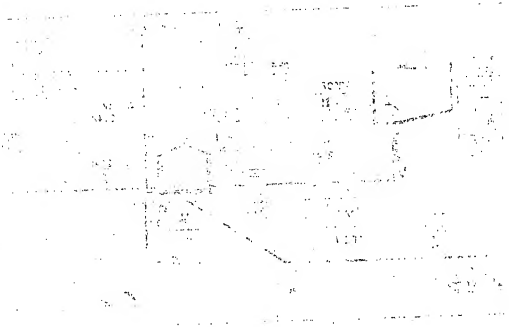
Method for generating operation and observation images for installation control systems

In order to simplify and facilitate the automation of the generation of operation and observation images for installation control systems, the invention proposes that an MCR scheme is taken as a basis and is decomposed into individual components in the form of functional elements and connection elements, the individual functional elements being replaced by representation elements or by masking-out elements and the representation and masking-out elements being combined again with the connection elements.



Description

The invention relates to a method for generating operation and observation images. Operation and observation images, also called process images, are created for the monitoring and/or control of industrial installations. They serve for the visual representation of process operations, measurement and regulation variables and/or of operating units.

Operation and observation images symbolize the electronic or electrotechnical realization of a measurement/control and regulation scheme (MCR scheme) created for example from the mechanical engineering side.

In the prior art, the procedure is usually such that, for example, from the mechanical engineering side, installations are planned and are represented on the control side in the form of an MCR scheme. This information is usually transferred in the form of lists or files, graphic representations in paper form or else as CAD files. The implementing electronics teams thus no longer have the items of relationship information between the schematic drawings or plans and the instrument lists, which are lost through the usual type of transfer and have to be elaborated manually again using the documents.

Taking this prior art as a departure point, the present invention is based on the object of providing a

method for generating operation and observation images for installation control systems which can be used to create operation and observation images in a simplified manner and automated to the greatest possible extent.

For the technical achievement of this object, the invention proposes that an MCR scheme is taken as a basis and is decomposed into individual components in the form of functional elements and connection elements, the individual functional elements being replaced by representation elements or by masking-out elements and the representation and masking-out elements being combined again with the connection elements.

In the case of the method according to the invention, it is thus possible to define decomposition orders, replacement or translation specifications and combination orders on the basis of the structured generation of the operation and observation images. As a result, the creation of the operation and observation images from MCR schemes that are taken as a basis can be simplified to the greatest possible extent. This is very simple in particular when the replacement is effected using a transformation table. The latter may preferably contain sector-typical transformation information items.

The MCR schemes contain as standard standardized individual elements (DIN 19227), so that both the decomposition into individual elements and the

identification for carrying out a transformation and the subsequent replacement can be schematized. As a result, the generation can be considerably simplified. The possibility is also afforded of using suitable computers and software for generating the operation and observation images in a manner automated to the greatest possible extent.

The use of masking-out elements serves to mask out functional elements that are contained in the MCR schemes and are not required in the process images. Insofar as connection elements, for example pipelines, are interrupted by the masking-out, the masking-out elements can, for their part, also contain connection elements in order to close the lines in the process images.

After the individual elements have been combined, the decomposition order usually being employed in reverse, a process image is produced which can represent the functional essential features of the installation.

In accordance with a particularly advantageous proposal of the invention, the individual representation and masking-out elements and also the connection elements can be grouped into representation units. These groupings correspond to the later individual process images, taking account of processing units.

The generation method according to the invention makes it possible to employ graphic methods which can proceed in a computer-aided manner. The image formats can be varied as desired and the finished process images can be converted into data formats which can be revised in the respectively desired process visualization system.

In addition to the representation and masking-out elements, dialog elements can be supplemented, which can be effected manually and/or likewise automatically. Further additional elements which are required in an installation-specific manner can also be supplemented or used instead of corresponding elements.

The transformation table may be based on a database, so that the entire generation method can be carried out to the greatest possible extent in a computer-aided manner.

The invention provides a complex method which greatly simplifies the generation of operation and observation images from supplied MCR schemes and makes use of the standardization of the supplied schemes and transformation possibilities that can be specified at least for individual sectors. Sectors in which the so-called MCR schemes are elaborated as control basis are, for example, the paper industry, the foodstuff and luxury food industry, power station construction or the chemical industry. The method according to the invention enables the future use of computers to

generate the desired images, the method enabling automation to the greatest possible extent.

Further advantages and features of the invention emerge from the description below with reference to the figure, in which:

Figure 1 shows an exemplary schematic representation of an operation of converting an MCR scheme into a process visualization image.

Figure 1 shows, on the upper side, a small detail from a standardized and standard-conforming MCR scheme in which the individual functional elements are identified in accordance with the standard and are incorporated into a control scheme using connection elements. Firstly, the individual components of the MCR scheme need to be identified. This can be done for example using an identification file which identifies the individual representation elements, taking account of the standard specifications, as functional element according to type and function or as connection element. At the same time or afterward, the individual identified components can be determined with regard to their relevance for the control technology. This can likewise be done using, if appropriate, sector-specific basic files or manually. Using a transformation table, which may likewise be stored as a database, the functional structures assigned to the components are identified and thus the dialog elements required for the operation of the components. If identified

components are not relevant for the control technology, they are replaced by a masking-out element, in which case, for example, connection lines into which these components were incorporated are closed again. For this purpose, use is made of masking-out elements in the form of corresponding pipeline representations. Finally, the translated individual elements are combined again, the processing units which correspond to the later individual process images preferably being formed in this phase. Finally, the graphics generated are converted into a data format which can be processed by the processing visualization system to be used. The desired or required dialog elements, addition information elements and the like, which also include message outputs, navigation aids, etc., are inserted or supplemented.

After the conclusion of these operations, the process visualization image shown on the lower side in figure 1 has been produced from the standard-conforming MCR scheme shown on the upper side.

This process visualization image generated may, for its part, in turn serve as a basis for the realization of the control technology.

Patent claims

1. A method for generating operation and observation images for installation control systems, an MCR scheme being decomposed into individual components in the form of functional elements and connection elements, the individual functional elements being replaced by representation elements or by masking-out elements and the representation and masking-out elements being combined again with the connection elements.

2. The method as claimed in claim 1, characterized in that representation elements or masking-out elements are replaced or supplemented by the dialog elements.

3. The method as claimed in one of the preceding claims, characterized in that the representation or masking-out elements are supplemented by additional elements.

4. The method as claimed in one of the preceding claims, characterized in that the decomposition and the combination are effected according to defined orders.

5. The method as claimed in one of the preceding claims, characterized in that the functional elements are replaced using a transformation table.

6. The method as claimed in one of the preceding claims, characterized in that connection supplementation elements are used instead of masking-out elements.

7. The method as claimed in one of the preceding claims, characterized in that the representation and masking-out elements and the connection elements are grouped into representation units.

8. The method as claimed in one of the preceding claims, characterized in that the operation and observation images generated are represented graphically.

9. The method as claimed in one of the preceding claims, characterized in that the operation and observation images generated are formatted to predetermined formats.

10. The method as claimed in one of the preceding claims, characterized in that a database is used as the transformation table.

11. The method as claimed in one of the preceding claims, characterized in that the operation and observation images are generated under software control.

12. The method as claimed in one of the preceding claims, characterized in that the operation and observation images generated are converted into a data format of a process visualization system.

Accompanied by 1 page of drawings

Key to figures

1 DRAWINGS PAGE 1

2 Number:

3 Date laid open:

4 October 22, 1998

5 Gray stock

6 Rinsing water

7 Accepted stock

8 Rejects

9 Seal water